IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Re: Attorney Docket No. Ansari 1-2

In re application of: Furquan Ansari et al.

Serial No.:	10/766,164	Group Art Unit:	2153
Filed:	1/28/04	Examiner:	Yasin M. Barqadle
Matter No.:	990.0492	Phone No.:	571-272-3947

For: Endpoint Address Change in a Packet Network

APPELLANT'S BRIEF UNDER 37 CFR 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22213-1450

Dear Sir:

In response to the final office action of February 6, 2008, and further to the notice of appeal filed on May 28, 2008, Appellant/Applicant submits the following Appellant's Brief in support of the appeal:

1.   **REAL PARTY IN INTEREST**

The real party in interest is Lucent Technologies Inc., assignee of all rights, title, and interest of the inventors.

2.   **RELATED APPEALS AND INTERFERENCES**

There are no related appeals or interferences.

3.   **STATUS OF CLAIMS**

Claims 1-22 are pending. The appealed claims are 1-22.

4.   **STATUS OF AMENDMENTS**

No amendments were filed after the February 6, 2008 Final Office Action.

5.   **SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates to migrating transport connections in a communications network, and, more particularly, to migration of existing sessions across addresses in a packet network. (p. 1, lines 5-7).

Normal network communication between two entities includes specifying a unique endpoint identifier, such as an internet-protocol (IP) address, that does not change during the communication period (p. 1, line 17 – p. 2, line 1). For example, a typical transmission-control protocol (TCP) connection establishment procedure between two endpoints (e.g., hosts) begins with the applications using a socket application programming interface (API) packet (*Id.*). Each socket API is associated with and is bound to a given 5-tuple, i.e., a logical construct containing five parameters used to identify the connection, comprising the following five elements (*Id.*). The first element is the "Protocol" element identifying the particular communication protocol for the packet (*Id.*). The second element is the "Source IP address" element identifying the IP address of the source node originating the packet (*Id.*). The third element is the "Source Transport Port" element indicating the port of the source node originating the packet (*Id.*). The fourth element is the "Destination IP Address" element identifying the IP address of the destination node to receive the packet (*Id.*). The fifth element is the "Destination Transport Port" element indicating the port

of the destination node receiving the packet (*Id.*). Any changes to any of these 5-tuple elements during a session will cause a session failure and typically initiates connection re-establishment (*Id.*).

The following terminology and definitions are employed as an aid to understanding the present invention (p. 6, line 27 – p. 7, line 11). A "migrator" or "migrating endpoint" is an end system that is currently in the process of changing or has already changed its IP address (*Id.*). The migrator is the end system that initiates a control message to a remote endpoint identifying its new IP address (*Id.*). A "non-migrator" or "non-migrating endpoint" or "fixed endpoint" is the remote endpoint system that does not change its IP address (*Id.*). The non-migrator accepts the control message sent by the migrator and responds back to the migrator with acknowledgment messages (*Id.*). A one-to-one relationship between migrator/non-migrator and client/server does not necessarily exist (*Id.*). For the TCP connections, a client is a system that initiates a TCP connection to another system, while the server is that system which provides a service, such as file transport protocol (FTP), Telnet, or secure shell (SSH), to the client (*Id.*). The migrator/non-migrator might be either a client or a server (*Id.*).

<div align="center">Exemplary Embodiment</div>

In an exemplary embodiment, shown in FIG. 1, a system 100 includes two nodes 101 and 102 communicating through the Internet 103 (p. 8, lines 8-31). Node 101 comprises two user applications APP1 and APP2 generating data processed by a transport-layer module 106 and a network-layer module 107 prior to transmission as packets through the Internet 103 (*Id.*). Node 102 comprises network-layer module 108 and transport-layer module 109 to process packets received from the Internet 103, to provide the data to application servers SRV1, SRV2, and SRV3 (*Id.*). Transport-layer modules 106 and 109 communicate based on, for example, the TCP protocol, and network-layer modules 107 and 108 communicate based on, for example, the IP protocol (*Id.*).

Application APP1 sets up and maintains a TCP/IP session with application server SRV1 (*Id.*). Seamless-transport endpoint-mobility (STEM) daemons 104 and 105 coordinate data exchange and control, such as identifying 5-tuple information including source and destination IP addresses, for nodes 101 and 102, respectively (*Id.*). STEM daemons 104 and 105 communicate through an out-of-band channel, i.e., a channel separate from the TCP session channel, shown in FIG. 1 as a user-datagram protocol (UDP) session passing through the Internet 103 (*Id.*).

Each STEM daemon is implemented with a dynamically-loadable kernel module (*Id.*). A daemon is a program that runs continuously and exists for the purpose of handling periodic service requests that a computer system expects to receive (*Id.*). The daemon program forwards the requests to other programs (or processes) as specified by a given communication protocol. The kernel modules of STEM daemons 104

and 105 modify their kernel data structures that store 5-tuple information (*Id.*). The 5-tuple uniquely identifies a kernel socket descriptor, which is a descriptor identifying the TCP/IP session in the application (*Id.*).

Sequence of Events During Migration

FIG. 2 shows an exemplary migration event sequence between a migrator and a fixed endpoint (the non-migrator) (p. 9, line 1 – p. 10, line 9). In this example, normal data transfer takes place between the two endpoints during the period 201 using IP address 192.168.1.1 for the migrator (*Id.*). In FIG. 2, messages through the TCP session are shown under (M) for data from the migrator and (F) for data from the fixed endpoint, while control messages through the out-of-band channel (e.g., UDP session) are shown under (M^D) for messages from the migrator and (F^D) for messages from the fixed endpoint (*Id.*). At a point after the connection setup, but before the IP address change point 202, the migrator optionally registers with the fixed endpoint using a registration request for which the fixed endpoint acknowledges with a reply through the out-of-band channel (*Id.*). This registration is done for security and to inform the fixed endpoint that the migrator is about to move or change its IP address (*Id.*).

The migrator might obtain the new IP address for its interface with a number of different methods (*Id.*). The migrator may itself request the address from a higher-level network manager or dynamic host-configuration protocol (DHCP) server, which will then assign and provide the address (*Id.*). Alternatively, the interface may be manually reconfigured to a new IP address (*Id.*).

At IP address change point 202, the migrator begins to change to a new address, e.g., IP address 192.168.2.99 (*Id.*). During the period 203 after IP address change event 202, the kernel module of the migrator (e.g., node 101) updates the IP address in the 5-tuple data structure associated with the socket descriptor (*Id.*). Each socket descriptor is uniquely associated with a 5-tuple (*Id.*). The kernel data structure update begins by searching all open socket descriptors and matching them against the specified 5-tuple (containing the old IP address as one of the tuples) (*Id.*). Once a valid match is identified, the appropriate change is made to this data structure to reflect the new IP (endpoint) address (*Id.*). In addition, packet transmission to the destination node is suspended (*Id.*). TCP data segments are buffered in the node's send queue (TCP send-Q) until a valid route is established (*Id.*).

Thus, as far as the application (e.g., APP1) is concerned, the changes to the kernel are transparent, since the application is still bound to the same socket descriptor (*Id.*). Thus, the application employs the same socket descriptor and continues to operate normally (*Id.*). Data sent on the modified socket descriptor yields a valid route/interface during the route lookup process (*Id.*). Concurrently, the migrator informs the remote, fixed endpoint of the change to the new endpoint IP address through out-of-band

communication (*Id.*). This out-of-band communication is shown as control message "migrate req" (*Id.*). Based on this information, the fixed endpoint applies similar changes to its kernel data structures such that the destination address in the IP header of the data packets sent out by the fixed endpoint reflects the new value (*Id.*). The fixed endpoint acknowledges the modification of its kernel (shown as control message "migrate reply") to the migrator, and the two endpoints resume communication as a normal TCP session in period 205 using the new IP address for the migrator (*Id.*). TCP data segments buffered in the TCP send-Q are sent out of the interface towards the destination, since there is a valid route, and the IP address of all packets transmitted contain the appropriate new address in the IP header (*Id.*).

Sequence of Events at Migrator

FIG. 3 shows an exemplary method employed for the migrator during the event sequence of FIG. 2 (p. 10, line 25 – p. 11, line 16). At step 301, the migrator is currently participating in an existing session with the non-migrator using a current endpoint IP address (*Id.*). At step 302, the migrator sends a Registration Request control message to the non-migrator through an out-of-band channel (e.g., a UDP channel) to register the migrator with the non-migrator (*Id.*). At step 303, if step 302 is performed, the migrator receives a Registration Reply control message from the non-migrator through the out-of-band channel as an acknowledgment of registration by the non-migrator (*Id.*).

At step 304, the migrator begins to change its current endpoint IP address to a newly acquired endpoint IP address ("new endpoint IP address") (*Id.*). At step 305, the migrator suspends transmission of packets, and enqueues the packets in the TCP send-Q (*Id.*). At step 306, the migrator begins dropping packets received from the non-migrator that contain the old endpoint IP address (*Id.*). At step 307, the migrator updates the migrator's kernel data structure of the STEM daemon to include the new endpoint IP address (*Id.*).

At step 308, the migrator sends an Endpoint Address Change control message to the non-migrator through the out-of-band channel to indicate that the migrator has changed to the new endpoint IP address (*Id.*). During this period, the migrator continues to enqueue packets in the TCP send-Q (*Id.*). At step 309, the migrator receives an Endpoint Address Change Acknowledgment control message from the non-migrator through the out-of-band channel indicating that the non-migrator has changed its kernel data structure to include the new endpoint IP address (*Id.*). At step 310, the migrator continues the session with the new endpoint IP address by releasing packets from the TCP send-Q (*Id.*).

Sequence of Events at Non-Migrator

FIG. 4 shows an exemplary method employed by the non-migrator during the event sequence of FIG. 2 (p. 11, line 17 – p. 12, line 14). At step 401, the non-migrator is currently participating in an

existing session with the migrator using a current Endpoint IP address (*Id.*). At step 402, the non-migrator receives a registration request from the migrator through an out-of-band channel to register the migrator with the non-migrator (*Id.*). At step 403, if step 402 is performed, the non-migrator registers the migrator and sends a registration reply control message to the migrator through the out-of-band channel as an acknowledgment of registration by the non-migrator (*Id.*).

At step 404, the non-migrator continues reception of packets from the migrator that contain the old endpoint IP address (*Id.*). At step 405, the non-migrator receives an Endpoint Address Change control message from the migrator through the out-of-band channel to indicate that the migrator has changed to the new endpoint IP address (*Id.*). At step 406, the non-migrator updates the non-migrator's kernel data structure of the STEM daemon to include the new endpoint IP address (*Id.*).

At step 407, the non-migrator sends an Endpoint Address Change Acknowledgment control message to the migrator through the out-of-band channel indicating that the non-migrator has changed its kernel data structure to include the new endpoint IP address (*Id.*). At step 408, the non-migrator continues the session with the new Endpoint IP address (*Id.*).

As clearly depicted in FIG. 1, STEM system 100 employs an out-of-band control channel, shown as UDP channel 150, to communicate between peers, such as STEM daemon modules 104 and 105 (*Id.*). Out-of-band communication through UDP channel 150 provides the advantage that the migrator might communicate its changes to the non-migrator even after the IP address change occurs (*Id.*). In addition, out-of-band communication might carry information pertaining to multiple TCP sessions concurrently (*Id.*).

<div align="center">Firewall-Filtering Rules</div>

Controlling the migration process in a smooth and systematic manner prevents conditions, called race conditions, which may generate TCP reset messages that would terminate the connection (p. 10, lines 10-24). Specifically, these conditions might be prevented by ensuring 1) that the migrator's kernel changes are always applied first before the non-migrator is informed of these changes and 2) that the migrator does not send any data on that session during the control message exchange period (*Id.*). Such prevention might be achieved, for example, by using firewall rules on the system (e.g., output chain rules of iptables in a Linux operating system) to prevent any session data from leaving the system until the migration process is complete (*Id.*). The rules are dynamically added to the kernel to explicitly prevent transmission of packets on this session to the remote endpoint (*Id.*). Once an acknowledgement from the non-migrator is received, the rules are withdrawn to resume normal operation (*Id.*). Alternatively, the reassignment of the old endpoint IP address might be delayed for a certain time period (*Id.*). This ensures that two different sessions do not concurrently employ the same IP address (*Id.*).

Independent Claims

The subject matter defined in each of the independent claims, along with references to exemplary supporting portions of the specification, is set forth below:

Claim 1 recites a method of migrating from a current endpoint address to a new endpoint address by a migrator during a session between the migrator and a non-migrator in a packet-based communication system. In step (a), the current endpoint address in the migrator is changed to the new endpoint address (p. 9, lines 16-23; p. 11, lines 3-4). In step (b), transmission, to the non-migrator, of packets with the new endpoint address is suspended (p. 9, lines 23-24; p. 11, lines 4-5). In step (c), the non-migrator is informed, via a channel separate from the channel of the session between the migrator and the non-migrator, of the change to the new endpoint address (p. 8, lines 21-23; p. 10, lines 27-29). In step (d), transmission, to the non-migrator, of packets with the new endpoint address is resumed (p. 10, lines 3-6; p. 11, lines 15-16).

Claim 12 recites a method of migrating from a current endpoint address to a new endpoint address by a non-migrator during a session between the non-migrator and a migrator in a packet-based communication network. In step (a), a control message indicating the migrator's change to the new endpoint address is received via a channel separate from the channel of the session between the migrator and the non-migrator (p. 9, lines 16-23; p. 11, lines 3-4). In step (b), in the non-migrator, the current endpoint address is changed to the new endpoint address (p. 10, lines 1-3; p. 11, lines 28-30). In step (c), the non-migrator's change to the new endpoint address is acknowledged to the migrator (p. 10, lines 3-6; p. 12, lines 1-4). In step (d), packets of the session with the new endpoint address are exchanged with the migrator (p. 10, lines 3-9; p. 11, lines 4-5).

Claim 20 recites a network comprising a migrator and a non-migrator (p. 6, line 27 – p. 7, line 11; p. 8, lines 8-9). The migrator is adapted to migrate from a current endpoint address to a new endpoint address during a session (p. 9, lines 16-23; p. 11, lines 3-4). The non-migrator is adapted to migrate from a current endpoint address to a new endpoint address during a session (p. 10, lines 1-3; p. 11, lines 28-30). The migrator is also adapted to i) change, in the migrator, the current endpoint address to the new endpoint address (p. 9, lines 16-23; p. 11, lines 3-4), ii) suspend transmission to the non-migrator of packets with the new endpoint address (p. 9, lines 23-24; p. 11, lines 4-5), iii) inform the non-migrator, via a channel separate from the channel of the session between the migrator and the non-migrator, of the change to the new endpoint address (p. 8, lines 21-23; p. 10, lines 27-29), and iv) resume transmission to the non-migrator of packets with the new endpoint address (p. 10, lines 3-6; p. 11, lines 15-16). The non-migrator is also adapted to i) receive, via a channel separate from the channel of the session between the migrator and the non-migrator (p. 9, lines 16-23; p. 11, lines 3-4), a control message indicating the migrator's

change to the new endpoint address, ii) change, in the non-migrator, the current endpoint address to the new endpoint address (p. 10, lines 1-3; p. 11, lines 28-30), iii) acknowledge, to the migrator, the non-migrator's change to the new endpoint address (p. 10, lines 3-6; p. 12, lines 1-4), and iv) exchange, with the migrator, packets of the session with the new endpoint address (p. 10, lines 3-9; p. 11, lines 4-5).

Claim 21 recites a computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to implement a method for migrating from a current endpoint address to a new endpoint address by a migrator during a session between the migrator and a non-migrator in a packet-based communication system. In step (a), the current endpoint address in the migrator is changed to the new endpoint address (p. 9, lines 16-23; p. 11, lines 3-4). In step (b), transmission, to the non-migrator, of packets with the new endpoint address is suspended (p. 9, lines 23-24; p. 11, lines 4-5). In step (c), the non-migrator is informed, via a channel separate from the channel of the session between the migrator and the non-migrator, of the change to the new endpoint address (p. 8, lines 21-23; p. 10, lines 27-29). In step (d), transmission, to the non-migrator, of packets with the new endpoint address is resumed (p. 10, lines 3-6; p. 11, lines 15-16).

Claim 22 recites a computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to implement a method for migrating from a current endpoint address to a new endpoint address by a non-migrator during a session between the non-migrator and a migrator in a packet-based communication network. In step (a), a control message indicating the migrator's change to the new endpoint address is received via a channel separate from the channel of the session between the migrator and the non-migrator (p. 9, lines 16-23; p. 11, lines 3-4). In step (b), in the non-migrator, the current endpoint address is changed to the new endpoint address (p. 10, lines 1-3; p. 11, lines 28-30). In step (c), the non-migrator's change to the new endpoint address is acknowledged to the migrator (p. 10, lines 3-6; p. 12, lines 1-4). In step (d), packets of the session with the new endpoint address are exchanged with the migrator (p. 10, lines 3-9; p. 11, lines 4-5).

6.   **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

This appeal presents the following issues:

(1) Whether the rejections of claims 1-5 and 8-22 under 35 U.S.C. §103(a) as being obvious over Funato et al., "TCP-R: TCP Mobility Support for Continuous Operation," *Network Protocols*, 1997 ("Funato") in view of U.S. Patent Application Pub. No. 2004/0151158 ("Gannage") are proper;

(2) Whether the rejection of claim 6 under 35 U.S.C. §103(a) as being obvious over Funato in view of U.S. Patent No. 6,072,942 ("Stockwell") is proper; and

(3) Whether the rejection of claim 7 under 35 U.S.C. §103(a) as being obvious over Funato in view of U.S. Patent App. No. 2004/0202160 ("Westphal") is proper.

7.   **ARGUMENT**

    A.   **Procedural Background**

Claims 1-5 and 8-22 under 35 U.S.C. § 103(a) stand rejected as obvious over Funato in view of Gannage, claim 6 stands rejected as obvious over Funato in view of Stockwell, and claim 7 stands rejected as obvious over Funato in view of Westphal.

In the first office action dated August 24, 2007, claims 1-6 and 8-22 were rejected as anticipated by Funato, and claim 7 was rejected as obvious over Funato in view of Westphal.

In the response filed on November 19, 2007, the Applicant amended independent claims 1, 12, 20, 21, and 22 to recite that a control message indicating the migrator's change to the new endpoint address is sent "via a channel separate from the channel of the session between the migrator and the non-migrator."

A final office action was issued on February 6, 2008, containing the rejections now pending. In the final office action, the Examiner added a new reference, Gannage, to the rejections of claims 1-5 and 8-22, rejecting these claims as obvious over the combination of Funato and Gannage. The Examiner newly cited Stockwell, issuing a new rejection of claim 6 as obvious over Funato in view of Stockwell. The Examiner maintained the rejection of claim 7 as obvious over Funato in view of Westphal

The Applicant filed a response to the final office action on March 28, 2008, arguing that the combination of Funato and Gannage is improper to reject claims 1-5 and 8-22. As to claim 6 and claim 7 depending from claim 6, the Applicant argued that Stockwell fails to disclose that for which it was cited. The Applicant further argued that claim 6 cannot properly be rejected based on Funato and Stockwell without including Gannage in the rejection, and that claim 7 cannot properly be rejected based on Funato and Westphal without including Gannage in the rejection.

An advisory action was issued on April 22, 2008, affirming the same grounds of rejection.

On May 28, 2008, the Applicant filed a notice of appeal, together with a pre-appeal brief request for review.

On June 20, 2008, a Notice of Panel Decision was issued, indicating that the appeal should proceed, and directing the Applicant to file an appeal brief.

    B.   **The Rejections of <u>Claims 1-5 and 8-22 are Improper</u>**

Claim 1 recites, *inter alia*, "informing the non-migrator, <u>via a channel separate from the channel of the session between the migrator and the non-migrator</u>, of the change to the new endpoint address." In

rejecting claims 1-5 and 8-22 as obvious over Funato and Gannage on pages 2-3 of the final office action, the Examiner alleges that Funato teaches all of the steps of claim 1 but acknowledges that "Funato does not explicitly show using a channel separate from the channel of the session between migrator and the non-migrator to inform changes." However, the Examiner argues that "[n]onetheless, this feature is well known in the art and would have been an obvious modification of the system disclosed by Funato, as evidenced by Gannage." The Examiner argues that:

> In analogous art, Gannage disclose "Notifications are out-of-band signals in that they occupy a totally separate channel from the main message channel. Examples of this are notifications that are established over TCP/IP sockets whereas the messages themselves are sent as HTTP traffic." (¶0023).

> Giving the teaching of Gannage, a person of ordinary skill in the art would have readily recognized the desirability and the advantage of modifying Funato by employing the separate channel notification system of Gannage to prevent overloading the existing session channel between the migrator and non-migrator with notification information. By send notification messages in a separate out of band channel will result a faster data deliver and reduction of transport delays.

In the Applicant's March 28, 2008 response to the final office action, the Applicant argued that the combination of Funato and Gannage is improper to reject claims 1-5 and 8-22 because Gannage is non-analogous art and because the Examiner failed to provide a valid suggestion or motivation in the prior art for combining Funato and Gannage. In response, the Examiner argued in the Advisory Action that Gannage is not non-analogous art and that the Examiner did not fail to provide a valid suggestion or motivation in the prior art for combining Funato and Gannage.

Gannage discloses a method for exchanging voice over data channels, e.g., to implement telephone conferencing (Title; Abst.; ¶[0003]). In Gannage, the "notifications" are fragments of voice data sent over a TCP/IP socket (¶¶[0024]-[0026]). Gannage states:

> We use a notification channel based approach for near real time data streaming for voice. ... The first element involves taking the voice input from the sender in small, digitized packets. ... The second element involves taking these time packets of voice data and sending them out in a sequential manner over the notification channel. As subsequent speech samples are composed, they are sent out sequentially over the notification channel. At the receiving end these packets of voice data are played back through the codec supported by the platform as they are received.

Id.

Gannage is non-analogous art, because Gannage is concerned with the problem of transferring voice over data channels, e.g., for telephone conferencing, while Funato is concerned with the problem of changing endpoint addresses. One skilled in the art of Funato would not have turned to Gannage for guidance regarding changing endpoint addresses, just as one skilled in the art of Gannage would not have

turned to Funato for guidance regarding transferring voice over data channels. Thus, Funato and Gannage are not properly combinable to reject claim 1 as obvious.

Indeed, Gannage has absolutely nothing to do with migrating from a current endpoint address to a new endpoint address in a packet-based communication system. Gannage uses a separate channel to send voice data, not to provide notification of a change of endpoint address. It is a fundamental deficiency of Gannage that Gannage does not use a separate channel or "notification channel" to provide *notification* of anything at all! The fact that Gannage discloses the use of a separate channel for one particular purpose, namely, the transmission of voice data, does not, in any way, suggest the desirability of using a separate channel to provide notification of a change of endpoint address in a method of migrating from one endpoint address to another.

The Examiner alleges two different improper motivations for combining Funato and Gannage.

First, the Examiner argues that one skilled in the art "would have readily recognized the desirability and advantage of modifying Funato by employing the separate channel notification system of Gannage to prevent overloading the existing session channel between the migrator and non-migrator with notification information." This motivation does not make sense. There is no disclosure in Funato or Gannage to suggest that overloading an existing session with notification information is a problem, nor that such a problem, if it did exist, would be solved by using a separate channel for notification information. In fact, the reason for using a separate channel in the present invention is <u>not</u> to prevent overloading an existing session, but rather, <u>so that the migrator can still communicate its changes to the non-migrator even after the IP address change occurs</u> (Applicant's specification, p. 12, lines 8-10). In other words, when an IP address change has occurred at a migrator, and the non-migrator is not aware of this change because the original session no longer provides communication with the migrator, using a separate channel permits the non-migrator to be informed of the IP address change so that it can resume communications with the migrator. In this scenario, overload of the existing session is not an issue, because <u>there is no longer an "existing session"</u> between the migrator and non-migrator once the migrator has changed its IP address – in fact, at that point, there is no "session" at all between the migrator and non-migrator until the non-migrator is made aware of the IP address change and communication resumes at the new IP address. Accordingly, the first motivation provided by the Examiner does not make sense in the context of Funato.

Apparently, the Examiner concedes that this first motivation is improper, because the Examiner fails to even address the Applicant's arguments on this issue in the advisory action.

Second, the Examiner argues that sending notification messages in a separate out-of-band channel will result in faster data delivery and reduction of transport delays. The Examiner further argues, in the advisory action, that "Gannage teaches by reduction the delay found in packet based network during audio

conversation over packet-based communication the quality can be improved to carry effective conversation." This second motivation also does not make sense. Gannage makes it clear that using a separate channel does not, in fact, reduce transport delays, but actually causes additional delays! For example, Gannage states that there may be an additional delay of one to ten seconds to transmit a fragment of voice data, which Gannage attempts to dismiss as minimal: "The overall experience derived by using our approach is near real time communication in which one receives a voice message with a small time lag in a pseudo streamed fashion with reasonably good quality. … In near real time communication, the audio content exchanged between the participants is delayed, but the participants may still carry on an effective conversation or other exchange of audio content. Illustratively, the delay may be greater than one second but less than ten seconds" (¶[0030]. Accordingly, the second motivation provided by the Examiner does not make sense in the context of Gannage.

The Examiner has provided no valid suggestion or motivation in the prior art for combining Funato and Gannage, and absent such suggestion or motivation, these references cannot properly be combined. Under the obviousness analysis provided by the Supreme Court recently in *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. ___, 127 S. Ct. 1727 (2007), it is "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed (Slip. Op. at 144). Moreover, in her May 3, 2007 Memorandum to Technology Center Directors, Margaret A. Focarino, Deputy Commissioner for Patent Operations, clearly states that "in formulating a rejection under 35 U.S.C. §103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed." In the present application, the Examiner has failed to identify any valid reason for combining Funato and Gannage, and therefore, the pending rejection of claim 1 as obvious over Funato and Gannage is invalid and should be withdrawn.

For all these reasons, the Applicant submits that claim 1 is allowable over Funato and Gannage. For similar reasons, the Applicant submits that claims 12 and 20-22 are allowable over Funato and Gannage. Since the rest of the claims depend variously from claims 1 and 12, it is further submitted that those claims are also allowable over Funato and Gannage.

Therefore, it is respectfully submitted that the rejections of claims 1-5 and 8-22 as obvious over Funato and Gannage are in error.

C.   The Rejection of Claim 6 is Improper

Claim 6 recites that "the step of suspending transmission of packets to the non-migrator at the transport layer comprises preventing or resolving a race condition by applying one or more firewall-filtering rules to prevent session data from leaving the system until the migration process is complete." In

rejecting claim 6 as obvious over Funato in view of Stockwell, the Examiner acknowledges that Funato fails to teach what is recited in claim 6. The Examiner cites Stockwell, at col. 16, lines 33-43, as supplying the missing teachings. This portion of Stockwell states:

> Note that utility functions should probably be added to the filter library to support opening and reading text files with the same file locking semantics used by the configuration library so that deadlock and race conditions will be avoided.

> Another function which may be provided through a modifier is to sanitize the message headers. Sanitizing the message headers means to remove information from the headers that potentially discloses information about the internal network which is not required by the mail delivery system to deliver the mail. Initially, this involve removing the Received-by lines on out-bound mail. Many other modifiers are also possible, such as ones that apply digital signatures or encrypt messages based on the destination address.

As can be seen, although this portion of Stockwell mentions the words "race conditions," there is no mention of firewall-filtering rules, nor of preventing session data from leaving a system until a migration is complete. This is because Stockwell's discussion of race conditions deals with opening and reading text files and has nothing to do with session data during an IP migration process. Since Stockwell fails to disclose the recitations of claim 6, namely, applying one or more firewall-filtering rules to prevent session data from leaving the system until the migration process is complete, no combination of Funato and Stockwell can possibly render claim 6 obvious.

Although Funato and Stockwell are the only references cited in the rejection of claim 6, the Examiner additionally makes passing reference to U.S. Patent No. 6,332,163 ("Bowman-Amuah") at col. 263, lines 57-67, which also mentions the words "race conditions":

> In order to prevent potential race conditions the client must be given sufficient time to respond to the keep alive message from the server before the context is deleted. Typically the client has a separate listener for upward messages originating at the server, so queuing is not an issue at the client end. However, a server is more likely to queue on the receiving end, especially in a system with high message rates.

However, as with Stockwell, this portion of Bowman-Amuah also fails to disclose what is recited in claim 6. This portion of Bowman-Amuah deals with providing sufficient time for responding to keep-alive messages, <u>not</u> applying one or more firewall-filtering rules to prevent session data from leaving a system undergoing an endpoint address migration until that migration is complete. Thus, no combination of Funato and Bowman-Amuah can possibly render claim 6 obvious.

Moreover, claim 6 depends from claim 5, which depends from claim 1.

Claim 1 recites, *inter alia*, "informing the non-migrator, <u>via a channel separate from the channel of the session between the migrator and the non-migrator</u>, of the change to the new endpoint address." Neither Funato nor Stockwell discloses this feature, nor does the Examiner allege that Funato or Stockwell

discloses this feature. No other reference is cited in the rejection of claim 6 as disclosing this feature, which is integral to claim 6 because claim 6 incorporates by reference all of the features of claim 1, including this feature. Since the Examiner cited only Funato and Stockwell in rejecting claim 6 and failed to cite any reference that discloses "informing the non-migrator, <u>via a channel separate from the channel of the session between the migrator and the non-migrator</u>, of the change to the new endpoint address," the rejection of claim 6 as obvious over Funato and Stockwell is improper.

With respect to the foregoing omission, the Examiner argues in the advisory action that the "Examiner believes that was more of typo error that would not have changed the grounds of the rejection as indicated in the office action," asserting that the Examiner meant to include Gannage in the rejection of claim 6 as disclosing the missing feature but failed to do so. Even if Gannage had been included in this rejection, however, the rejection would still be improper. The deficiencies of the combination of Funato and Gannage as applied to claim 1 are fully discussed above. Since claim 6 depends indirectly from claim 1, and the combination of Funato and Gannage is improper, claim 6, as well as claim 7, which depends from claim 6, is allowable over any combination of Funato, Stockwell, and Gannage.

For the above reasons, it is respectfully submitted that the rejection of claim 6 are in error.

D.   The Rejection of <u>Claim 7 is Improper</u>

Claim 7 depends from claim 6, which depends from claim 5, which depends from claim 1.

Claim 1 recites, *inter alia*, "informing the non-migrator, <u>via a channel separate from the channel of the session between the migrator and the non-migrator</u>, of the change to the new endpoint address." Neither Funato nor Westphal discloses this feature, nor does the Examiner allege that Funato or Westphal discloses this feature. No other reference is cited in the rejection of claim 7 as disclosing this feature, which is integral to claim 7, because claim 7 incorporates by reference all of the features of claim 1, including this feature. Since the Examiner cited only Funato and Westphal in rejecting claim 7 and failed to cite any reference that discloses "informing the non-migrator, <u>via a channel separate from the channel of the session between the migrator and the non-migrator</u>, of the change to the new endpoint address," the rejection of claim 7 as obvious over Funato and Westphal is improper. With respect to the foregoing omission, the Examiner argues in the advisory action that the "Examiner believes that was more of typo error that would not have changed the grounds of the rejection as indicated in the office action," asserting that the Examiner meant to include Gannage in the rejection of claim 7 as disclosing the missing feature but failed to do so. Even if Gannage had been included in this rejection, however, the rejection would still be improper. The deficiencies of the combination of Funato and Gannage as applied to claim 1 are fully discussed above. Since claim 7 depends indirectly from claim 1, and the combination of Funato and Gannage is improper, claim 7 is allowable over any combination of Funato, Westphal, and Gannage.

Moreover, claim 6 recites that "the step of suspending transmission of packets to the non-migrator at the transport layer comprises preventing or resolving a race condition by applying one or more firewall-filtering rules to prevent session data from leaving the system until the migration process is complete." Neither Funato nor Westphal discloses this feature, nor does the Examiner allege that Funato or Westphal discloses this feature. No other reference is cited in the rejection of claim 7 as disclosing this feature, which is integral to claim 7, because claim 7 incorporates by reference all of the features of claim 6, including this feature. Since the Examiner cited only Funato and Westphal in rejecting claim 7 and failed to cite any reference that discloses that "the step of suspending transmission of packets to the non-migrator at the transport layer comprises preventing or resolving a race condition by applying one or more firewall-filtering rules to prevent session data from leaving the system until the migration process is complete," the rejection of claim 7 as obvious over Funato and Westphal is improper.

For the above reasons, it is respectfully submitted that the rejection of claim 7 is in error.

F.   **Conclusion**

For the foregoing reasons, Applicant requests that this appeal be sustained, that the pending rejections be reversed, and that all claims pending in the application be allowed.

Respectfully submitted,

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1.   A method of migrating from a current endpoint address to a new endpoint address by a migrator during a session between the migrator and a non-migrator in a packet-based communication system, the method comprising the steps of:

(a) changing, in the migrator, the current endpoint address to the new endpoint address;

(b) suspending transmission to the non-migrator of packets with the new endpoint address;

(c) informing the non-migrator, via a channel separate from the channel of the session between the migrator and the non-migrator, of the change to the new endpoint address; and

(d) resuming transmission to the non-migrator of packets with the new endpoint address.

2.   The invention of claim 1, wherein step (a) comprises the steps of logically changing to the new endpoint address and updating a kernel structure of the migrator.

3.   The invention of claim 2, wherein the migrator changes to the new current address by changing from a current 5-tuple comprising the current endpoint address to a new 5-tuple comprising the new endpoint address, and updating the kernel structure of the migrator comprises modifying a socket with the current 5-tuple to reflect the new 5-tuple, the socket being associated with the session.

4.   The invention of claim 2, wherein step (a) comprises the steps of registering with the non-migrator before initiating the change to the new endpoint address.

5.   The invention of claim 1, wherein step (b) comprises the steps of dropping packets from the non-migrator received at the network layer and suspending transmission of packets to the non-migrator at the transport layer.

6.   The invention of claim 5, wherein the step of suspending transmission of packets to the non-migrator at the transport layer comprises preventing or resolving a race condition by applying one or more firewall-filtering rules to prevent session data from leaving the system until the migration process is complete.

7.   The invention of claim 6, further comprising the step of dynamically adding and

withdrawing the firewall-filtering rules for a given session during tuple update communication between the migrator and non-migrator.

8. The invention of claim 1, wherein step (c) comprises the steps of sending a control message to the non-migrator informing the non-migrator of the change to the new endpoint address and receiving a confirmation from the non-migrator that the non-migrator has changed to the new endpoint address.

9. The invention of claim 1, wherein, for steps (a) through (d), the session conforms to a transmission control protocol and an Internet protocol.

10. The invention of claim 1, wherein the method is implemented in a processor of a node in a packet network.

11. The invention of claim 10, wherein, for step (d), the session comprises packets exchanged between the migrator and non-migrator in at least one of a wired communication network and a wireless communication network.

12. A method of migrating from a current endpoint address to a new endpoint address by a non-migrator during a session between the non-migrator and a migrator in a packet-based communication network, the method comprising the steps of:
    (a) receiving, via a channel separate from the channel of the session between the migrator and the non-migrator, a control message indicating the migrator's change to the new endpoint address;
    (b) changing, in the non-migrator, the current endpoint address to the new endpoint address;
    (c) acknowledging, to the migrator, the non-migrator's change to the new endpoint address; and
    (d) exchanging, with the migrator, packets of the session with the new endpoint address.

13. The invention of claim 12, wherein step (b) comprises the steps of logically changing to the new endpoint address and updating a kernel structure of the non-migrator.

14. The invention of claim 13, wherein the non-migrator changes to the new current address by changing from a current 5-tuple comprising the current endpoint address to a new 5-tuple comprising the new endpoint address, and updating the kernel structure of the non-migrator comprises modifying a

socket with the current 5-tuple to reflect the new 5-tuple, the socket being associated with the session.

15.   The invention of claim 13, wherein step (a) comprises the steps of registering the migrator before receiving the control message.

16.   The invention of claim 12, wherein step (b) includes the step of continuing to receive packets from the migrator during the change.

17.   The invention of claim 12, wherein, for step (d), the session conforms to a transmission control protocol and an Internet protocol.

18.   The invention of claim 12, wherein the method is implemented in a processor of a node in a packet network.

19.   The invention of claim 18, wherein, for step (d), the session comprises packets exchanged between the migrator and non-migrator in at least one of a wired communication network and wireless communication network.

20.   A network comprising:
a migrator adapted to migrate from a current endpoint address to a new endpoint address during a session; and
a non-migrator adapted to migrate from a current endpoint address to a new endpoint address during a session,
    wherein the migrator is adapted to:
        i) change, in the migrator, the current endpoint address to the new endpoint address,
        ii) suspend transmission to the non-migrator of packets with the new endpoint address,
        (iii) inform the non-migrator, via a channel separate from the channel of the session
    between the migrator and the non-migrator, of the change to the new endpoint address, and
        iv) resume transmission to the non-migrator of packets with the new endpoint address, and
    wherein the non-migrator is adapted to:
        i) receiving, via a channel separate from the channel of the session between the migrator
    and the non-migrator, a control message indicating the migrator's change to the new endpoint
    address,

ii) change, in the non-migrator, the current endpoint address to the new endpoint address,

(iii) acknowledge, to the migrator, the non-migrator's change to the new endpoint address, and

(iv) exchange, with the migrator, packets of the session with the new endpoint address.

21.   A computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to implement a method for migrating from a current endpoint to a new endpoint address by a migrator during a session between the migrator and a non-migrator in a packet-based communication system, the method comprising the steps of:

(a) changing, in the migrator, the current endpoint address to the new endpoint address;

(b) suspending transmission to the non-migrator of packets with the new endpoint address;

(c) informing the non-migrator, via a channel separate from the channel of the session between the migrator and the non-migrator, of the change to the new endpoint address; and

(d) resuming transmission to the non-migrator of packets with the new endpoint address.

22.   A computer-readable medium having stored thereon a plurality of instructions, the plurality of instructions including instructions which, when executed by a processor, cause the processor to implement a method for migrating from a current endpoint address to a new endpoint address by a non-migrator during a session between the non-migrator and a migrator in a packet-based communication network, the method comprising the steps of:

(a) receiving, via a channel separate from the channel of the session between the migrator and the non-migrator, a control message indicating the migrator's change to the new endpoint address;

(b) changing, in the non-migrator, the current endpoint address to the new endpoint address;

(c) acknowledging, to the migrator, the non-migrator's change to the new endpoint address; and

(d) exchanging, with the migrator, packets of the session with the new endpoint address.

APPENDIX B

EVIDENCE

No evidence has been submitted pursuant to 35 U.S.C. §§ 1.130, 1.131, or 1.132, nor was any other evidence entered by the Examiner and relied upon by the Applicant in this appeal

APPENDIX C

RELATED PROCEEDINGS

There are no related proceedings.

TRANSMITTAL OF APPEAL BRIEF (Large Entity)	Docket No. Ansari 1-2

In Re Application Of: **Furquan Ansari et al.**

Application No.	Filing Date	Examiner	Customer No.	Group Art Unit	Confirmation No.
10/766,164	**01/28/2004**	**Barqadle, Yasin M.**	**46850**	**2153**	**3389**

Invention:
ENDPOINT ADDRESS CHANGE IN A PACKET NETWORK

COMMISSIONER FOR PATENTS:

Transmitted herewith is the Appeal Brief in this application, with respect to the Notice of Appeal filed on:
05/28/2008

The fee for filing this Appeal Brief is: **$510.00**

☐ A check in the amount of the fee is enclosed.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. __50-0782__. I have enclosed a duplicate copy of this sheet.

☒ Payment by credit card. Form PTO-2038 is attached.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

/Kevin M. Drucker/
Signature

Dated: **07/28/2008**

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